

CLAIMS

1. A heat exchanger of plate fin and tube type comprising a plurality of fins stacked at given intervals to one another, and a plurality of heat exchanger tubes penetrating said fins in the fin-stacking direction, said heat exchanger being designed to perform a mutual heat exchange between a fluid inside said heat exchanger tubes and another fluid outside said heat exchanger tubes, through said heat exchanger tubes and said fins, wherein

each of said fins is provided with a plurality of cut-raised portions, one or more cut-raised portions corresponding to each of said heat exchanger tubes being disposed substantially only within a region of said fin satisfying the following relationship,

$$W_s = (1 - \phi) D_p + \phi D$$

$$\phi > 0.5$$

, wherein W_s is an entire spread width of said one or more cut-raised portions corresponding to each of said heat exchanger tubes in a column direction defined as a direction extending along an end of said fin on the upstream side of said fluid outside said heat exchanger tubes;

D is an outer diameter of each of said heat exchanger tubes; and

D_p is an alignment pitch of said heat exchanger

tubes in said column direction.

2. The heat exchanger according to claim 1, wherein said one or more cut-raised portions corresponding to each of said heat exchanger tubes are disposed only in a region of said fin which falls within 130 degree in the central angle of said corresponding heat exchanger tube, toward the upstream or downstream direction of said fluid outside said heat exchanger tubes.

3. The heat exchanger according to claim 1 or 2, wherein said cut-raised portion has two opposite edges disconnected from the main body of said fin, at least one of said edges extending obliquely relative to said column direction.

4. The heat exchanger according to any one of claims 1 to 3, wherein said cut-raised portion has two opposite edges disconnected from the main body of said fin, at least one of said edges extending in the radial direction of said corresponding heat exchanger tube.

5. The heat exchanger according to any one of claims 1 to 4, wherein said cut-raised portion has two opposed side ends not-disconnected from the main body of said fin, at least one of said side ends extending in a direction perpendicular to said column direction.

6. The heat exchanger according to any one of claims 1 to 5, wherein two or more cut-raised portions are provided for each of said heat exchanger tubes, said cut-raised portions

being disposed symmetrically with respect to an axis passing through the center of said corresponding heat exchanger tube and extending in a direction perpendicular or parallel to said column direction.

5 7. The heat exchanger according to any one of claims 1 to 6, wherein said cut-raised portion has a shape raised alternately in the longitudinal direction of said heat exchanger tubes on the basis of the main body of said fin.

10 8. The heat exchanger according to any one of claims 1 to 7, wherein said fin is provided with a convex-shaped protrusion continuously extending in said column direction.

15 9. The heat exchanger according to any one of claims 1 to 8, wherein said cut-raised portions is cut and raised from the main body of said fin to form a bridge shape which has a leg segment connected to said main body, and a beam segment spaced apart from said main body.